

THE ECONOMICS OF BEEF PRODUCTION



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THE ECONOMICS OF BEEF PRODUCTION

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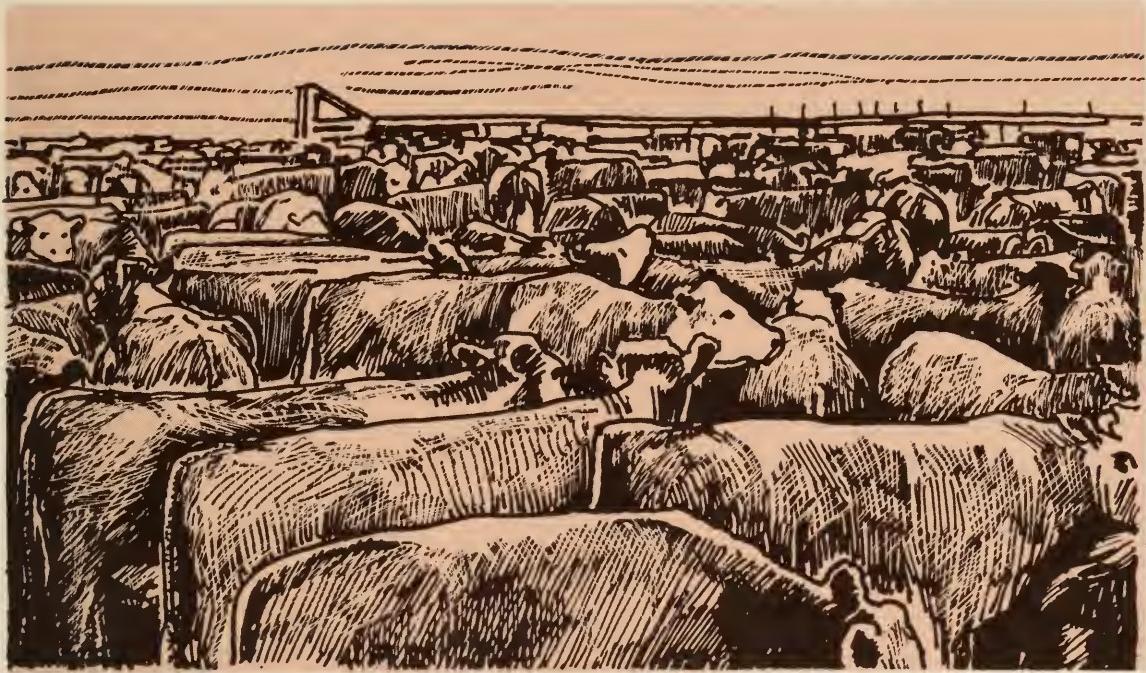
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CONTENTS

TRENDS IN THE BEEF INDUSTRY	5
Size of the Canadian beef herd	5
Consumption of beef	5
Number of livestock farms	6
Prices to producers	6
COW-CALF BUSINESS	9
Farms in Eastern Canada	9
Prairie farms	11
Western ranches	14
BEEF CATTLE FINISHING	18
Age and grade of feeder cattle	18
Price of feed	19
Length of feeding period	19
Price and feed margins	19
Market outlook	20
Feeder cattle finishing in Eastern Canada	21
Feeder cattle finishing in Western Canada	24
DAIRY BEEF	26
Veal calves	26
Dairy steers	27
MARKETING CHANNELS	29
Direct to packing plants	29
Public stockyards	30
Auction markets	30
At the farm	31
ACKNOWLEDGMENTS	32
SELECTED BIBLIOGRAPHY	32

Beef production in Canada is increasing in importance as a source of farmers' income. In the late 1920's, income from the sale of cattle and calves represented about 10 per cent of total farm cash receipts. In recent years the proportion has been about 20 per cent. Ontario farmers obtain the greatest proportion of their receipts from this source, about one quarter, while Quebec farmers have the least, about 15 per cent.



TRENDS IN THE BEEF INDUSTRY

Size of the Canadian Beef Herd

Over the past quarter century the number of beef-type animals on Canadian farms has shown a general upward trend, with peaks occurring in 1944-45, 1956-57 and 1964-65. The trend in beef cow numbers, also, has been generally upward: in 1941, there were about half a million head; by 1965, the number had reached almost 2.9 million, a record to date. Over the same period, the numbers of yearling heifers kept for beef has more than tripled.

Relative increases in the beef breeding herd (cows and heifers) have differed somewhat by regions. In 1945, a peak in the cattle cycle, the total number of beef cows and heifers in Canada was 1.3 million. By 1965, the numbers had tripled to 3.9 million head. Over the same period, the greatest relative increase — almost fivefold — occurred in Quebec. The smallest increase was in British Columbia, where there was a doubling in numbers. However, the national picture reflects the predominance of the prairie region. In 1945, 71 per cent of the beef breeding herd was in this region, and by 1965 the proportion had increased to 74 per cent of the total.

Consumption of Beef

Per capita beef consumption in Canada averaged about 58 pounds in 1941. Consumption fell off somewhat in the 1950's, but it has been trending upwards since, and by 1966 was 83 pounds. Total beef consumption has been projected to reach 98 pounds per capita by 1980. In the United States, per capita beef consumption reached 100 pounds in 1964.

Several factors have contributed to the rise in the consumption of beef in Canada. The principal components of domestic demand are the larger popula-

tion, up by 70 per cent since 1941, and higher real per capita personal incomes, up by almost 100 per cent over the same period. In 1965, expenditures for food at the retail level by all consumers comprised 22 per cent of total personal expenditures, or \$360 per capita. Twenty-five years earlier the food proportion of personal expenditures was 25 per cent.

Expenditures for food at the retail level are fairly responsive to changes in consumer incomes. Various studies have shown that a 10 per cent increase in real per capita income has resulted in an increase of about 4½ per cent in the food purchased per person. However, demand by consumers for food products as they come from the farm — that is, at the farm price level — is generally unresponsive to income and price changes. A 10 per cent increase in real consumer income per person will usually result in a gain of only about 1½ per cent in per capita consumption of foods in terms of farm production. In other words, most of the increase is for services associated with food processing and distribution. Consumer demand for beef is more responsive to price and income changes than is the demand for foods in general.

Number of Livestock Farms

In 1961, there were 86,500 farms in Canada that could be classified as "livestock farms." These were farms from which the sales of cattle, hogs and sheep represented more than half the total farm sales. Livestock farms represented about one quarter of all farm types in both 1961 and 1951.

The largest concentration of livestock farms is in Ontario, 43 per cent of all such farms in Canada; Alberta follows with 28 per cent. Since 1951, the number of livestock farms has declined, along with the downward trend in numbers of all farms, in all the eastern provinces and in Saskatchewan. However, the numbers have increased in British Columbia by 23 per cent, by 14 per cent in Manitoba and by 3 per cent in Alberta. The over-all decline (16 per cent) in the number of livestock farms from 1951 to 1961 was greater than the decrease (9 per cent) in the total number of farms. Livestock farms ranked third in the total number of farms in 1951, but in 1961 they ranked first, followed by dairy farms and wheat farms.

Prices to Producers

Livestock prices in general have shown some upward trend for the period under review, with some wide annual fluctuations (Figure 1). In 1965, prices of livestock and livestock products were 70 per cent higher than in 1945 but only 18 per cent higher than 1955 prices. Beef prices have shown much the same general trend. Livestock prices have increased more than crop prices. In the 1940's, the index of livestock prices was about 1¼ times the crop price index. By the 1960's, the livestock price index was 1½ times higher.

Annual average livestock prices tell one story, but it is important to consider also the seasonal variation within a year. Prices for all cattle tend to be highest in relation to the annual average in April, May and June. In 1964-65, the prices for these months were 7 per cent above the average. In the periods

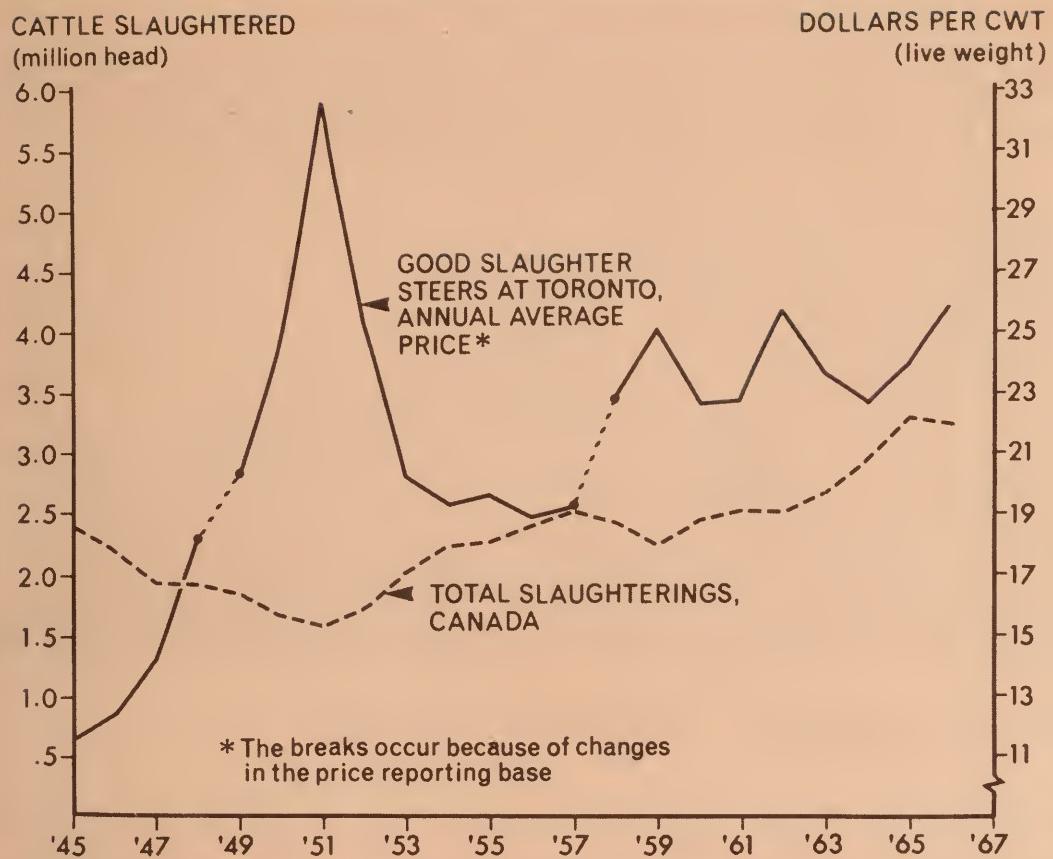


Figure 1 — Trends in slaughterings of cattle and steer prices, Toronto Market, 1945-66.

1956-57 and 1964-65, monthly prices were above the annual average from March to the end of July by about 5 to 6 per cent.

In recent years, there has been a narrowing of the seasonal market differentials between the East (Toronto) and the West (Winnipeg). In 1956-57, the differential on the annual average good slaughter steer prices amounted to \$1.10 per hundredweight in favor of Toronto, but in 1964-65, it was 80 cents. This differential narrows during the summer. In 1956-57, the August differential of 94 cents was the lowest. However, in 1964-65, May had the lowest differential: only 10 cents a hundredweight in favor of the Toronto market.

Various factors account for the higher livestock prices on the Toronto market than on western markets such as Winnipeg. One of the principal factors involved is the larger urban consuming market in Eastern Canada, centered around Toronto and Montreal. The difference between prices for good slaughter steers on the Toronto market is less, however, than the cost of rail transportation. The rate on livestock from Winnipeg to Toronto is \$1.76 a hundredweight live (effective March 1, 1964). The rate on dressed carcasses is relatively lower at \$2.20 a hundredweight. Other factors than freight costs separate the two markets. These include handling and shrinkage costs. In recent years, lower

costs for transportation of meats by refrigerator truck have helped to equalize prices on eastern and western markets. The overriding influence, however, is the impact of United States cattle production and the demand for beef on the North American cattle prices. The price context in which Canadian producers operate is the so-called 'export equivalent' price.



COW-CALF BUSINESS

The cow-calf beef operation is usually considered to begin with the keeping of breeding females and to end with the weaning of their calves at 400 to 500 pounds. At this weight the calves may be sold as stockers and feeders, retained for raising to "long yearlings" at 15 to 18 months, or retained for finishing as fed calves or heavier animals. Practices vary among producers, depending upon such factors as the relative prices of feeder calves and finished animals, the price and availability of feed, pasture conditions and labor supply.

The age and finish at which animals are sold depends on a number of factors, such as relative prices of the various classes of animals, availability of pasture and feed, cost of feed and availability of labor. Generally, overhead costs for the basic breeding herd, buildings and pasture figure heavily in the total cost structure for cow-calf producers, whether they are farm-type operators or ranch-type operators. Management practices are important in cow-calf operations, particularly as they affect losses caused by disease, predators or calving. A high calf-crop percentage is essential for success. In ranching operations, access to a large acreage of rough grazing land at low cost is essential, but improved land for the production of winter feed is also necessary. Low labor requirements are important to cow-calf operators, as are minimal expenditures for supplementary feeding. These points have been brought out in various studies, several of which are discussed in the following pages.

Farms in Eastern Canada

In the cow-calf operation, feed costs are relatively lower than for the finishing phases. The following figures show the distribution of the major costs

in raising beef calves to weaning weight for a sample of farms averaging 30 breeding females under southern Ontario conditions at 1965 prices:

	<i>Costs per head</i>	<i>Percentage of total cost</i>
Feed	\$55.36	54
Labor	17.68	17
Interest on investment	12.00	12
Housing and equipment	12.72	13
Other costs	4.04	4
Total	101.80	100

Source: Adapted from *Farm Management Data Book*, Farm Economics, Co-operatives and Statistics Branch, Ont. Dept. Agric. and Food, Aug. 1966.

Liveweight prices for calves in the fall of 1965 averaged about \$107 a head for 400-pound animals. This would leave a return to operator's risk and management of about \$5 a head or \$1.25 a hundredweight on the basis of the above costs.

In the Maritime Provinces and Quebec, there are relatively few farms that can be classified as "beef" farms — less than 10 per cent of the total. Generally in this region, beef production is combined with other livestock operations, especially dairying, or with off-farm work.

In 1965, a study of a group of 20 beef farms in the Sackville area of New Brunswick provided some indication of the costs and returns from this type of enterprise in Eastern Canada. However, one quarter of the total acreage in these farms was cultivated marshland. Also, these farms averaged 55 head of cattle. Thus, this group of farms cannot be considered typical in terms of land use or of size of herd. Perhaps there is, in fact, no "typical" enterprise for Eastern Canada. The data on these farms can be summarized as follows:

	<i>Ten beef farms with highest gross receipts</i>	<i>Ten beef farms with lowest gross receipts</i>	<i>All twenty beef farms</i>
averages per farm			
Beef cows (head)	25	10	17
Other cattle, including			
dairy cows (head)	46	31	38
Total cattle (head)	71	41	55
Total farm capital (\$)	31,890	19,420	25,655
Investment in livestock (\$)	9,085	4,682	6,883
Total farm area (acres)	614	278	446
Improved pasture (acres)	171	56	113
Marshland (acres)	93	37	65
Upland (acres)	78	19	48
Farm cash receipts:			
Cattle sales (\$)	4,889	1,517	3,203
Total farm cash receipts (\$)	8,572	3,167	5,874

(Table continued)

(Table concluded)

Farm cash expenses:

Livestock and feed (\$)	1,997	550	1,272
Total farm cash expenses ^{a/} (\$)	7,182	2,802	4,991
Net farm income (\$)	1,390	371	883
Non-farm income (\$)	660	1,474	1,067
Total income (\$)	2,050	1,845	1,950

Source: G. C. Retson, *Marshland Farming in the Sackville Area of New Brunswick*, *Canadian Farm Economics*, Vol. 1, No. 3, Aug. 1966.

^{a/} Includes current capital outlays.

A notable feature of these farms is that they are not, generally, full-time farming enterprises, even with the relatively large acreage of land per farm for this region. Some of the larger beef farms in the group, however, used as much as 1½ man-years of labor, including the operator. In the case of farms with the highest gross receipts, non-farm income contributed 32 per cent to total net income, whereas on the 10 farms with the lowest gross income, the non-farm income was four times the farm income. For the 20 farms, expenses (excluding operator and family labor, and interest on equity capital) were 85 per cent of cash farm receipts. These farms, in fact, provided the operators with a base of operations for non-farm activities or a source of retirement income.

Prairie Farms

The raising of beef calves to various weights is an important source of income to many operators of grain-livestock combination farms in the Prairie Provinces. The ages and weights at which the calves are marketed depend upon the circumstances prevailing in any given year. These circumstances include availability and price of feed, both grain and forage, relative prices of the different classes of animals and availability of labor.

The following data illustrate the role of livestock for mixed grain-livestock farms in three different soils areas of the Prairie Provinces. These data are expressed as group averages but the farms were selected to include in the sample the range of sizes found in these areas.

	Somerset-Manitou, Man., 1964 (Black and Grey- Black soils)	Davidson, Sask., 1964, (Dark Brown soils)	Gull Lake- Maple Creek, Sask., 1963 (Brown soils)
Number of farms	74	37	41
		averages per farm	
Total farm area (acres)	500	940	1,400
Area of hay, pasture and unimproved land (acres)	145	175	615
Livestock investment as per cent of total investment (%)	10	10	19

(Table continued)

(Table concluded)

Livestock sales as per cent of total farm receipts (%)	29	26	29
Cattle sales (head)	12	14	26
Man-equivalents	1.8	1.3	1.3
Total farm investment (\$)	60,800	71,700	56,100
Livestock investment (\$)	6,100	7,175	10,500
Total farm receipts (\$)	13,150	12,000	14,630
Livestock sales (and inventory increase) (\$)	3,820	3,200	4,200
Total farm expenses (including depreciation) (\$)	6,450	6,650	6,260
Direct livestock expenses (including purchases) (\$)	985	635	770
Net farm income (\$)	6,700	5,350	8,370

Source: M. Ragush and L. M. Johnson, studies of farm organization in the Prairie Provinces, Economics Branch, Can. Dept. Agric., various reports.

The Saskatchewan farms were one-man operations, while the Manitou group averaged close to two-man operations. Livestock sales accounted for between a quarter and a third of the total farm revenue. Livestock sales in the Black, Grey-Black and Dark Brown soil zones were largely steers and heifers, averaging 750 to 800 pounds apiece. Sales from the farms in the Brown soil zone, by contrast, were largely calves, averaging somewhat over 500 pounds each. This illustrates one of the differences between livestock operations in the more humid zones of the Prairies and in the drier regions of southwestern Saskatchewan. In the former areas, feed, especially pasture and hay, is more plentiful and, together with home-grown grain, permits finishing animals to heavier weights on the farm. On the other hand, the grazing season is somewhat longer in the prairie area than in the Parkland areas. However, in all these areas, livestock are used to convert low-value roughage into a more saleable commodity. Total pasture and rough grazing land represents, by groupings, a fifth of the average total farm acreage in the Brown soil area, almost a third in the Black to Grey-Black soil zone and about 45 per cent on the Brown soil zone farms. These data are representative for a relatively large number of prairie farms.

Results from a 1965 Alberta cow-calf enterprise analysis further highlight the important factors in a profitable operation. This study was carried out on 94 farms located in the three major soil zones of the province. The enterprises ranged in size from 11 cows to 234 cows wintered; the over-all average being 60 cows. The following table summarizes the costs and returns for the lowest cost third of all enterprises studied in each of the three soil zones.

	Brown and Dark-Brown soils	Thin Black soils	Black soils	All farms
Number of farm	11	9	12	32
Cows wintered per farm (no.)	76	74	47	64

(Table continued)

(Table concluded)

Buildings and machinery				
investment per cow (\$)	25.40	48.40	45.00	39.22
Calf crop (%)	91.5	81.9	86.7	87
Labor per cow (hours)	8.1	10.0	9.7	9.2
per cow wintered				
Feed and pasture	\$41.05	\$41.01	\$44.23	\$42.23
Other operating expenses ^{a/}	7.58	7.21	7.57	7.47
Overhead ^{b/}	12.92	15.67	15.44	14.64
Total expenses	61.55	63.89	67.24	64.34
Gross receipts	80.79	74.90	80.18	78.90
Return to all labor and operator's management	19.24	11.01	12.94	14.56

Source: B. A. Hackett, 1965 *Alberta Cow-Calf Enterprise Analysis*, Alberta Dept. Agric. pub. 814-420-2, 1966.

^{a/} Direct and allocated operating expenses, excluding labor.

^{b/} Buildings, equipment and interest on livestock.

The following table summarizes the costs and returns for all the farms surveyed.

	Brown and Dark-Brown soils	Thin Black soils	Black soils	All farms
Number of farms	32	27	35	94
Cows wintered per farm (no.)	63	69	49	60
Building and machinery				
investment per cow (\$)	57	63	57	59
Percentage calf crop (%)	90	86	86	87
Labor per cow (hr.)	9.9	9.2	9.6	9.6
per cow wintered				
Feed and pasture	\$48.87	\$55.60	\$55.72	\$53.21
Veterinary and medicine	2.20	1.09	1.94	1.76
Other operating expenses ^{a/}	8.80	8.90	8.12	8.62
Overhead ^{b/}	17.82	18.78	18.24	18.27
Total expenses	77.69	84.37	84.02	81.86
Gross receipts	81.69	79.95	82.68	81.42
Return to labor (hired and unpaid family) and to operator's labor and management	4.00	-4.42	-1.34	-0.44

Source: B. A. Hackett, 1965 *Alberta Cow-Calf Enterprise Analysis*, Alberta Dept. Agric. pub. 814-420-2, 1966.

^{a/} Direct and allocated operating costs, excluding labor.

^{b/} Buildings, equipment and interest on livestock.

The calf crop averaged 87 per cent for both the low-cost third and the 94

farms. Gross returns per cow wintered, calf crop and average value per calf weaned did not vary much from one area to another, although the farms in the Brown and Dark Brown soil zones had somewhat lower costs, principally due to lower feed costs.

When the data were grouped by size of enterprise, measured in number of cows wintered, it was noted that average labor requirements decreased as size of enterprise increased. Variable costs, that is feed (including pasture), veterinary and other operating costs remained relatively constant regardless of size. Gross returns per cow wintered ranged from \$41 to \$105, depending on the percentage calf crop and the calf weaning weight. Calf crop ranged from 60 to 100 per cent and weaning weight of calves from 350 to 520 pounds.

Western Ranches

Ranches in Alberta and Saskatchewan are important sources of calves and steers for feeding. The following figures illustrate the organization of a selected group of 102 ranches in Alberta, based on data for 1961-62. The revenue and expense data have been adjusted to normal yields, livestock gains and operating costs. This procedure was necessary because 1961 was an abnormally dry year. The adverse conditions were most pronounced in the Shortgrass region.

	Foothills region	Shortgrass region
Number of ranches	51	51
averages per ranch		
Total capital investment ^{a/}	\$114,900	\$55,600
Cattle investment (foundation stock)	18,800	11,200
Total ranch receipts (adjusted)	19,000	13,900
Total operating expenses (including depreciation)	10,500	9,300
Net ranch income	8,500	4,600

Source: K. Elgaard, *Address to the Western Stock Growers Association Annual Meeting*, Medicine Hat, Alberta, Feb. 2-3, 1965.

a/ Includes the value of owned and rented land, including Crown range, but not permit grazing land.

In the Foothills region, the total acreage operated per ranch was 2,080, of which 75 per cent was operator-owned. In the Shortgrass region, however, the acreage operated was 3,130 acres per ranch, with only 23 per cent operator-owned. The balance was leased or rented grazing land. In the Foothills region, the number of cattle kept averaged 163 per ranch compared with 85 head in the Shortgrass region. As a rough measure of carrying capacity, this would be 13 acres per head in the Foothills and 37 acres in the Shortgrass area.

Forty-three of the 102 ranches were primarily cow-feeder calf operations. On the other ranches, the animals were sold mainly as calves or yearlings; while a few were slaughter animals. Basically, however, these ranches produce unfinished animals. Herd sizes ranged from 30 cows for the smallest cattle enterprise to 300 cows for the largest. The study indicated that size of business,

up to a point, was important in determining the level of income from ranching — the reduction in average costs of production up to a level of \$10,000 sales was significant. Further reductions in average costs were attained beyond this point but at a much slower rate, and they tended to level off at sales of \$22,000. The break-even point appeared to be at a gross sales figure of \$15,000. However, the group average for the Foothills area ranches was actually less than this.

The study showed that selling yearlings resulted in significantly higher returns to an operator's investment than selling calves. However, a rise in prices for feeder calves relative to feeder yearlings would alter this situation — other factors remaining unchanged.

Cattle ranching is carried on extensively in the interior plateau region of British Columbia, using both owned and leased grazing land. Average carrying capacity is about 3 to 5 acres an animal unit for five months. (An animal unit is defined as one mature cow or equivalent in other livestock on the basis of feed consumed.)

In 1958-59, the Economics Branch of the Canada Department of Agriculture undertook a study of the ranching business in this area. A total of 80 ranches were included, of which 26 ranches obtained about \$3,700 in operator's labor earnings — the highest group average. These were not the largest ranches, however, in terms of number of head of cattle sold, acreage or capital investment; so size in itself was not the most important factor in determining income.

Two of the main factors contributing to financial success in the ranching business in this region appeared to be location and management practices. The highest income ranches were more favorably located, many being in the open grassland areas. They were so situated that leased acreages were available for spring and fall grazing. Management practices associated with the more successful ranches included low losses caused by disease, predators or calving, a high calf-crop percentage, efficient labor utilization and lowest operating costs in relation to output. Access to low-cost lease land for grazing, however, appeared to be one of the most important factors.

A more recent study of beef production in British Columbia was undertaken for the East Kootenay area in 1964. Forty full-time beef producers provided information on their farm businesses. The farms were grouped on the basis of "high" and "low" operator's labor income so that a comparison could be made of the factors affecting incomes. The following data summarize the expenses and receipts on these farms.

	<i>High operator's labor income</i>	<i>Low operator's labor income</i>	<i>All farms</i>
Number of farms	20	20	40
	per farm		
Animal units in beef	93	84	89
Total animal units	99	90	95
Total acres operated	868	716	792
	per animal unit		
Crop expenses	\$ 4.52	\$ 5.52	\$ 5.00

(Table continued)

(Table concluded)

Feed purchases	2.60	2.55	2.57
Hired and unpaid family labor	8.08	11.01	9.47
Livestock expenses ^{a/}	2.83	2.42	2.63
Equipment expenses and custom work	10.16	13.49	11.76
Taxes, irrigation charges, building and fencing repairs	6.50	5.09	5.83
Net capital costs ^{b/}	18.45	20.72	19.53
Interest on investment (5%)	37.25	36.34	36.81
Miscellaneous	1.66	2.04	1.84
Total expenses	92.05	99.18	95.44
Gross receipts ^{a/ c/}	110.06	86.51	98.81
Perquisites	7.28	7.57	7.41
Total receipts	117.34	94.08	106.22
Return to operator's labor and management	25.29	-5.10	10.78

Source: N. D. Turnbull, Beef Farming in the East Kootenay Area of British Columbia, 1964, *Canadian Farm Economics*, Vol. 1, No. 5, pp. 26-31.

^{a/} Excluding value of livestock purchased.

^{b/} Capital expenses less capital receipts.

^{c/} Including inventory increase.

The average size of operation of these two groups of ranches did not differ very greatly. However, the expenses per animal unit were about \$7 higher for the low-income group and receipts per animal unit were much less, by over \$23. The high-income group of farmers obtained better average prices than did the low-income group by selling a greater proportion of finished steers and proportionately fewer calves. This group also had a somewhat better calf crop (82 per cent) than did the low-income group (77 per cent). This difference was reflected in "increase in inventory," a part of the gross receipts.

A 1965 farm business management study provides some further useful indications of the costs and returns for a selected group of ranches throughout the interior of British Columbia. The data for these farms were grouped by capital investment, as follows:

	Investment per ranch			
	Less than \$50,000	\$50,000 to \$99,999	\$100,000 and over	All ranches
Number of ranches	10	21	16	47
		per farm		
Capital investment (\$)	35,156	74,133	132,084	85,568
Total animal units	36	86	153	98
Total acres operated	437	700	958	732
		per animal unit		
Crop expenses	\$ 12.09	\$ 10.92	\$ 5.97	\$ 8.38

(Table continued)

(Table concluded)

Feed, pasture, veterinary, etc.	28.78	18.26	19.37	19.67
Hired and unpaid family labor	24.46	15.70	17.29	17.23
Equipment expenses	26.05	18.46	14.65	17.02
Overhead and miscellaneous	19.06	10.93	11.52	11.87
Net capital costs ^{a/}	45.86	31.26	—	7.92
Interest on investment @ 5%	48.98	43.00	43.11	43.52
Total expenses	205.28	148.53	111.91	125.61
Net livestock sales ^{b/}	128.41	79.14	60.14	72.88
Other receipts ^{c/}	79.07	36.83	54.04	41.33
Total receipts	207.48	115.97	114.18	114.21
Return to operator's labor and management	2.20	-32.56	2.27	-11.40

Source: John Pankratz and Peter H. Chau, *The Business of Farming and Ranching in British Columbia, 1965*, Farm Economics Division, B.C. Dept. Agric., Sept. 1966.

- a/ Capital expenses plus inventory increase, less capital sales plus inventory decrease (when capital gains exceed losses, the amount is credited to "other" receipts).
- b/ Livestock sales, less value of livestock purchases.
- c/ Other farm products, value of income in kind and net capital gains.

In the table on the East Kootenay area, the data were grouped to illustrate the factors associated with varying levels of income. However, in this table, the data are grouped to show those factors associated with varying levels of investment. In this latter study, returns to operator's labor and management were almost the same for the small ranches, averaging 437 acres, as they were for the large units, averaging 958 acres operated. The in-between grouping of 700 acres showed a loss on the year's operations, principally because of the small crop receipts (included in other receipts). The value of crop sales for this group was less than that for the other two groups because of the smaller acreage of cropland. Improved acres accounted for 17 per cent of the total acreage operated, compared to 30 per cent on the small ranches and 19 per cent on the large ranches. This relationship supports the conclusion noted in the 1958-59 study of British Columbia ranches, namely that access to a minimum amount of improved land suitable for crop production or good grazing is an important factor in profitability of beef production (in combination with a large acreage of cheaper grazing land).



BEEF CATTLE FINISHING

Beef cattle finishing falls into two distinct types of operations. First, there are those producers who finish off their own calves, yearlings or older cattle to market weights under summer or winter feeding conditions and, second, there is that group of producers who buy stocker calves, yearlings or older animals for finishing. The farmer who finishes his own animals may be producing beef as a supplementary enterprise to utilize rough pasture, or as a means of obtaining a better return for his grain. However, the feedlot operator or farmer who purchases stockers for finishing is usually a more specialized beef producer. While he has to consider all the same factors as the farmer who finishes his own animals, in addition he has to consider the spread in price between feeder and slaughter cattle and the type and condition of animals available. The main factors, which all beef producers who finish animals for the market have to consider, are in the following five general areas.

Age and Grade of Feeder Cattle

The kind and amount of feed available determines to a large extent the age and grade of cattle to buy. Generally, low-quality roughages are marketed to greater advantage through older, lower-grade cattle, while higher-quality concentrates and roughages are fed to best advantage through younger and higher-grading cattle and calves.

Calves generally are considered less risky than older animals to feed for the following reasons:

- Calves need less feed per pound of gain because they are growing as well as fattening;

- Calves are more flexible. They can be resold as feeders or full-fed and marketed as finished animals any time up to two years of age.

The advantages of feeding older cattle are in many respects simply the opposite of feeding younger cattle. The chief advantages include the following:

- There is usually a wider margin between purchase price and selling price per pound.
- They consume more roughage in relation to concentrates.
- They are better adapted to utilizing lower-quality roughages.
- They reach market weight in less time.

However, feeding older animals must be considered a more speculative enterprise than feeding calves because of the importance of the price margin in determining profits. A producer feeding older animals is buying more pounds of beef to resell than is the buyer of calves.

Price of Feed

The price of feed has a bearing on the kind of feeders to buy. If feed prices are high in relation to the price of finished beef, it is necessary to make the profit on the price margin rather than on the weight gains. This feed price situation favors the purchase of heavy animals that will be ready for market after a gain of 200 to 300 pounds. However, with low-priced feed and high-priced feeder cattle, the profits have to come from low-cost gains rather than from the price margin. Under these conditions, light yearlings or calves would be more profitable. In recent years, cheap feed, with the exception of limited supplies of feeds arising as by-products such as pelleted weed screenings, has had little influence on profits in feeding. The value of low-cost feed tends to be bid into the buying price of feeder cattle.

Length of Feeding Period

The length of the feeding period is largely governed by the available feed supply. This, in turn, influences the type of animals a producer will buy. A feedlot operator who has a large quantity of feed to market as beef probably will look for light animals in a grade corresponding to the feed quality. Depending on initial condition, 3 to 4 months of heavy feeding is required for two-year-old steers to reach "choice" condition. Yearlings require 6 to 7 months and calves need 8 to 9 months. "Common" grades of cattle are usually fed for shorter periods than these and with a larger percentage of roughages in the ration.

Price and Feed Margins

The kind of feeder cattle bought is also determined by the spread, or "price margin," between feeder cattle prices and slaughter cattle prices. The price margin is simply the difference between the buying and selling price per pound. Three types of price margins can be distinguished:

- Positive margins, when the buying price per pound is less than the selling price per pound.
- Even margins, when the buying and selling prices are the same.
- Negative margins, when the buying price is higher than the selling price.

Price margin is a significant factor determining profits from feeding cattle.

If the price of feeder cattle is low compared with the price of slaughter cattle, heavy-weight feeders generally are more profitable for a given margin than are light-weight feeders. With narrow margins between feeder and slaughter cattle prices, lower-quality feeders may be more profitable if, by proper feeding and management, the grade can be raised. Feed costs determine the sort of price margin a producer can operate with successfully. If the feedlot gains are expensive and cost more per pound to produce than the selling price per pound, then the feedlot operator must sell at a positive margin to make a profit.

There are three main factors to consider in relation to the size of the price margin in order to show a profit:

- A greater price margin is needed with high-cost feeding than with low-cost feeding. "High-cost feeding" could be the result of high feed prices, or of inefficient feed conversion, or of both. If the feed margin is negative, the price margin must be large enough to offset this.
- Initial weight is important. The more an animal weighs at the time of purchase, the greater is the effect of price margin, either positive or negative, because the buying price is applied to more pounds of animal. With a positive margin, there is a profit on the purchase weight of the animal; with a negative margin, there is a loss on this weight.
- A smaller price margin can be accepted with young, high-quality cattle. Younger cattle put on cheaper gains and usually bring the best finished prices.

In addition to the price margin, there is also what is known as the "feed margin." This is the difference between the selling price of the gain in weight and the feed cost of the gain. If the feed cost for finishing steers was 16 cents per pound of gain and the selling price of the steers was 24 cents per pound, there would be a 2-cent feed margin. Both positive feed and price margins make a feeding enterprise profitable, but if both margins are negative, the enterprise is unprofitable. If only one of the margins is negative, profits can still be made under the right circumstances.

Taking all of these considerations together, on a rising market, steer feeding is more attractive because of the weight gain together with the positive price margin. However, with negative or even price margins, calves are more profitable than yearlings or older animals because of the larger relative gains and better feed conversion.

Market Outlook

The price margin discussed in the preceding section refers to the *current* price of feeder cattle in relation to the *expected* price of finished animals at time of marketing. This means that the market outlook is an important consideration in determining the weights and grades of feeder animals to buy. If the immediate market outlook is good but the longer term appears uncertain,

then heavy-weight feeder cattle are less risky. This is because heavy animals can be short-fed for 90 to 120 days and marketed before a possible price break. Under these market outlook conditions, yearling heifers are less risky than steers. Yearling heifers reach a given market grade a month sooner than steers of the same age. Heifer prices, however, for the same grades are normally below steer prices.

Feeder Cattle Finishing in Eastern Canada

The following figures indicate the relative importance in 1965 of the various costs in finishing purchased calves or yearlings under central and southern Ontario conditions.

	Costs per cwt. of gain		Per cent of total cost	
	Purchased calves	Purchased yearlings	Purchased calves	Purchased yearlings
Feed	\$10.48	\$16.36	70	70
Labor	0.89	1.78	6	7
Interest	1.81	2.74	12	11
Housing and equipment	1.29	2.16	8	9
Other costs	0.57	0.69	4	3
Total	15.04	23.73	100	100

Source: Adapted from *Farm Management Data Book*, Farm Economics, Co-operatives and Statistics Branch, Ont. Dept. Agric. and Food, Aug. 1966.

In this particular study, the purchased calves were sold at an average weight of 965 pounds after being kept 360 days. The purchased yearlings were sold at an average weight of 1,140 pounds after 300 days on feed. Hours of labor used averaged one hour a hundredweight for purchased calves and about two hours for purchased yearlings.

Feeding practices followed by feedlot operators vary considerably, and the feeds used will have considerable influence on the feed cost per pound of gain. The following figures illustrate the differences which do occur. These data refer to 45 feedlot operators in southwestern Ontario in 1964. The number of cattle fed averaged not less than 150 head a year per feedlot.

There was considerable variability in costs within groups. For example, in the group feeding corn silage and high-moisture corn, feed costs per pound of gain ranged from 9.2 cents to 16.6 cents — which covered the range of all group average costs. Overhead costs in facilities and equipment averaged 5 to 6 cents a pound for all groups and bedding, veterinary, medicine and death loss costs totalled 1.3 cents a pound. The range on overhead costs was from as low as a tenth of a cent a pound up to 4 cents.

Ration	Feed costs per cwt. of gain
Mostly corn silage	\$ 9.80
Corn silage and high moisture grain corn	12.00

(Table continued)

(Table concluded)

Corn silage, high moisture grain corn and cob meal	12.90
Corn silage, low moisture grain corn and cob meal	14.20
Corn silage and small grains	15.40
Corn silage and low moisture grain corn	16.00

Source: P. A. Wright, Findings from a Survey of Ontario Beef Feedlot Operations, Dept. of Agric. Economics, University of Guelph, 1964.

Feedlot finishing of cattle on farms in eastern Ontario and western Quebec is an important enterprise on individual farms. Most commonly, these farms depend upon the purchase of western Canadian feeders, but local animals may be obtained at auction sales, together with their own production. In some cases these farmers are able to utilize cheap sources of concentrates, but the main advantage they have is low-cost quality pasture and roughage. On farms with dairy enterprises, the feeding of steers and heifers is supplementary in the use of labor.

A study conducted in 1964-65 of cattle feeding operations on a small group of farms in eastern Ontario and western Quebec provides some indication of the factors affecting costs and returns in this area. The results of the study can also be considered quite widely applicable to Eastern Canada. Some of the most important facts derived from the analysis, grouped by feeding period, are shown in the following table.

	Group I Fall 1964 to Fall 1965	Group II Spring 1965 to Fall 1965	Group III Year-round buying and selling		
			Low	High	All
Number of farms	4	6	9	9	18
averages per farm					
Purchase weight (lb.)	582	919	765	786	776
Gain per head (lb.)	428	223	316	271	293
Days on farm (no.)	332	155	206	159	181
Daily gain per head (lb.)	1.29	1.44	1.53	1.70	1.62
Land operated (acres)	301	243	289	468	378
dollars per hundredweight of gain					
Costs:					
Feed — home-grown	\$ 8.45	\$ 0.29	\$ 10.07	\$ 5.52	\$ 7.80
purchased	5.72	7.73	9.90	13.89	11.89
Pasture	3.09	8.49	3.60	2.22	2.91
Veterinary and drugs	0.20	0.11	0.11	0.12	0.12
Buildings and equipment	1.97	0.79	2.24	1.55	1.89
Interest on loans ^{a/}	1.76	1.17	0.91	1.04	0.98
Buying and selling	3.28	5.48	2.41	1.92	2.17
Miscellaneous	0.24	0.53	0.42	0.18	0.30
Total	24.71	24.59	29.66	26.44	28.06
Value produced ^{b/}	34.40	33.75	34.29	36.90	35.60

(Table continued)

(Table concluded)

Interest on fixed capital (5%)	1.32	0.30	1.20	0.69	0.93
Returns to labor and management	8.37	8.86	3.43	9.77	6.61
Price paid c/	20.71	21.36	20.62	20.33	20.48
Price received c/	25.52	23.45	23.38	23.32	23.35
Price margin	+4.81	+2.09	+2.76	+2.99	+2.87
Return over feed cost	+8.26	+6.94	-0.19	+1.69	+0.75

Source: A. M. Boswell, Beef Feeding in Eastern Ontario, 1964-65, *Canadian Farm Economics*, Vol. 2, No. 3, Aug. 1967, pp. 23-31.

a/ For purchase of feed and livestock.

b/ Value of total gain during feeding period divided by corresponding weight increase from feeding.

c/ Including the value of animals on hand at the beginning and end of the period.

The 28 farms in the study were located in the counties of Carleton, Lanark and Renfrew in Ontario and Pontiac in Quebec. Much of the land in this area is best suited to production of pasture and forage crops. The farm operators specialized in cattle feeding and purchased almost all of their feeders. Two thirds of the feeders were from local sources and one third were from outside Ontario or Quebec, mostly Western Canada. The number of cattle sold annually by these farms averaged 164 head, ranging from a low of 32 to a high of 510 head.

The returns to labor and management, after deducting a 5 per cent return on investment, were favorable. This was partly due to the sharp upward movement which occurred in cattle prices in the study period. For cattle of heavier weights, this factor was particularly significant and is evident in the returns realized by the farmers in Groups II and III (high production group).

Somewhat offsetting the favorable price margin were two unfavorable crop years resulting from severe drought. However, in spite of the positive price margin, total expenses per farm for the 28 farms (excluding all labor and interest on investment but including cost of cattle) were equal to 90 per cent of total receipts. This is an indication of the narrow margin of profit for cattle feeding operations.

Low feed costs, whether in terms of low unit feed prices or efficient feed conversion or both, are an important determinant of profits for all types of feeding operations. This is so because feed makes up approximately three quarters of the total cost, excluding labor. Feed costs are most important with light-weight animals. In Group I, the feeder cattle were purchased at comparatively light weights and thus required much longer feeding periods to reach market weight.

The study suggests that the effective utilization of resources available, particularly pasture, forage and labor, were more important for a successful feeding operation in this area than was the system of feeding. The relatively low labor requirements for cattle feeding as practised in this area permitted many of the farm operators to engage in off-farm work.

The availability of pasture was another important factor influencing the feeding program and the profitability of the enterprise. The 28 farmers operated

an average of 338 acres, a larger than average farm for the area, of which 242 acres were in hay and pasture. Rented pasture, which accounted for 37 acres per farm, was a significant resource on these farms. This fact highlights the need for access to a relatively large acreage of pasture land. The farmers expanded their own holdings by renting land to obtain sufficient pasture and forage.

Feeder Cattle Finishing in Western Canada

In a previous section, cow-calf ranching operations in Alberta were discussed. The finishing of beef in farm feedlots is another important segment of the beef production industry in that province.

A survey in 1962-63 of 28 feedlots in each of three selected areas of Alberta provides a good indication of the costs of producing beef under Alberta conditions. In the following table all costs are expressed in terms of 1965 price relationships. The number of animals fed in each of the three groups was 208 (East Central), 293 (West Central) and 196 (Southern).

	Costs per cwt. of gain			Per cent of total cost		
	East Central	West Central	Southern	East Central	West Central	Southern
Hay and grain	\$15.03	\$15.94	\$17.51	61	64	66
Pasture	1.05	0.54	0.42	4	2	2
Labor	1.39	1.19	1.64	5	5	6
Interest	1.88	2.32	2.14	8	9	8
Housing and equipment	2.43	2.68	2.51	10	11	9
Other costs	2.96	2.20	2.41	12	9	9
Total	24.74	24.87	26.63	100	100	100

Source: D. F. Haythorne and K. Elgaard, *Alberta Cattle Feeding Study*, 1962-63, Economics Branch, Can. Dept. Agric., Edmonton, 1965.

The animals fed in these farm feedlots averaged 650 pounds at the start of feeding and about 1,000 pounds at the finish. The total number of days kept averaged 140, for a daily gain of 1.8 pounds. Average daily gains by area were 1.9, 1.7 and 1.8 pounds a day, respectively.

Labor requirements averaged about two hours per hundredweight of gain. Labor costs decreased markedly as size of operation increased. Feed and pasture costs were the most important single category of costs, and the least variable costs from one feedlot to another.

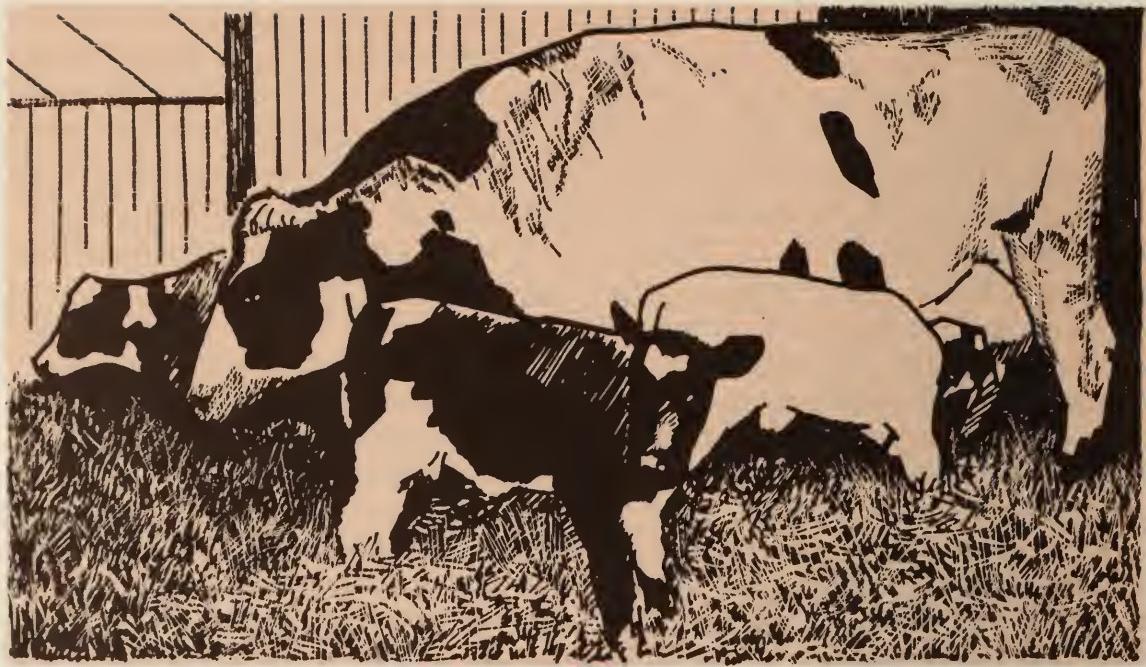
These figures include certain feedlots which fed calves only and a few feeding long yearlings exclusively. A comparison of the two groups indicate that it was much less costly to put several hundred pounds of gain on calves. Feed costs per hundredweight of gain averaged \$14.40 for calves and \$19.10 for long yearlings.

Some of the more important production practices followed by these feedlot operators are of interest. About half the operators purchased half of their feeders from ranchers or farmers directly and the balance through commission firms. One rule that buyers of feeder cattle try to follow is to obtain animals from the same source, especially ranch-raised animals. These can usually be

identified by brand. In this way feedlot operators are more assured of a uniform lot of feeder animals. The large feedlot operators tended to buy cattle throughout the year, whereas the small operators purchased feeders mainly in the fall. The overall average feeding experience of these operators was 14 years. Feeding is not the in-and-out sort of business that it is sometimes said to be.

Management plays an important role in profitable finishing of beef animals. In trials conducted by R. D. Clark at the Canada Department of Agriculture Research Station, Lethbridge, Alberta, supplemental grain feeding of steers on irrigated pasture increased average daily gains, profit margin per steer and profit margin per acre as compared with pasture feeding only. Full-grain feeding, however, was only marginally more profitable than part-grain feeding. Two factors were primarily responsible for the greater profitability of grain feeding: higher average daily weight gains, and higher percentage of "choice" grades.

Tests conducted at the Department's experimental farms at Melfort, Saskatchewan, by S. E. Beacom and at Kamloops, British Columbia, by W. A. Hubbard have shown that restricting winter gains of steers on grain and hay in order to take advantage of lower-cost gains on pasture in the following season is unprofitable. At Melfort, steers which had been restricted to daily gains of $\frac{1}{2}$ pound during the winter were not able to compensate for this by the end of the grazing season. As a result, they weighed less and had lower carcass grades than steers overwintering at 1 or $1\frac{1}{2}$ pounds of gain per head daily. Results were generally similar for the Kamloops test.



DAIRY BEEF

Dairy herds are an important source of part of the nation's total beef supply. This comes about through the sale of veal calves, dairy steers, cross-bred cattle and cull dairy cows. The farm income from the sale of beef originating from dairy cows in 1965 was estimated to be almost 40 per cent of the total farm cash income from the sale of cattle and calves.

Veal Calves

Calves sold at a few days of age are called "deacon" or "bob" calves. Many surplus dairy calves are disposed of in this manner. This method lends itself to a highly specialized dairy operation where the size of the milking herd is at the maximum permitted by the feed and labor supply. The costs, including death losses, are minimal for "bob" calves. The only feed required is colostrum from the dam and a small quantity of saleable milk.

Veal calves at birth weigh 70 to 100 pounds, depending on breed and other factors. "Good" and "choice" veal calves are six to eight weeks of age and weigh approximately 200 pounds. To qualify for top grades, the meat must be light in color, indicating that the calf has not been fed hay or grain.

Veal calves fed whole milk require approximately 10 pounds of milk to produce a pound of gain. Thus, the gain from a birth weight of 80 pounds to a market weight of 225 pounds is 145 pounds. This gain would require 1,450 pounds of milk which, if valued at \$4 a hundredweight, would be a feed cost of \$58 a calf or \$27.60 a hundredweight of gain. In 1965, "good" and "choice" veal calves averaged \$30.50 a hundredweight live on the Toronto market. In addition to the milk cost, other costs would be incurred from death losses, and veterinary, labor, overhead and marketing expenses.

Death losses have an important effect on the profitability of veal production. A death loss of 4 to 5 per cent is not unusual, and losses of up to 10 per cent can be expected with purchased calves. There is, of course, wide variability in death losses, and good management can minimize these costs. Veterinary expenses, death losses, hauling costs and depreciation on buildings and equipment can amount to as much as \$4 a calf.

The feed cost of raising veal calves can be reduced by the use of milk replacers. With whole milk valued at \$3 a hundredweight, feed cost per pound of gain, including supplements, approaches 30 cents. However, this feed cost can be reduced to 22 cents a pound when a high fat milk replacer is fed. This is illustrated in the following figures, based on tests with 32 male Holstein calves and 1963 feed prices.

<u>Ration</u>	<i>Market weight (lb.)</i>	<i>Average daily gain (lb.)</i>	<i>Feed cost per pound of gain (¢)</i>
Whole milk	225	2.25	26
Whole milk	275	2.23	30
Commercial milk replacer	225	1.65	24
Commercial milk replacer	275	1.89	23
15% fat replacer	225	1.91	22
15% fat replacer	275	1.90	23

Source: Adapted from: J. B. Stone, J. C. Rennie and R. H. Ingram, *A Comparison of Different Procedures for the Production of Veal Calves*, *Canadian Journal of Animal Science*, Dec. 1963.

On the basis of an average price of \$30 a hundredweight for veal calves, the feed margin with the commercial milk replacer and calves fed to 275 pounds would be 7 cents a pound of gain. The margin was 8 cents with a 15% fat replacer and calves marketed at 225 pounds. The slower rates of gain using milk replacer as compared with whole milk are more than offset by the lower feed cost. Other costs, such as death losses, would have to be considered in any decision to use milk replacers.

Dairy Steers

Dairy steers or dairy-beef crosses usually make higher rates of gain than do beef-type steers of similar weight. Dairy steers are generally larger-type animals than beef steers, and when animals of the same weight are compared the beef steer will be a more mature animal. Rate of gain and feed conversion efficiency decrease for dairy steers with increased maturity and degree of finish. This means that it is particularly important to control the end point to which animals are carried for finish. Average daily gains for dairy steers on roughage alone can be expected to range from 1.7 to 2 pounds and from 2.3 to 2.5 pounds for those receiving concentrate at the rate of 1 per cent of body weight in addition to roughage.

There are two other factors which affect the profitability of feeding dairy steers as compared with beef types. Beef-type cattle have an advantage over dairy types of less stomach and intestinal tract, giving them a 2½ to 3 per cent advantage in dressing percentage. The greater size of the digestive tract of dairy steers also means that they have a greater capacity to fill or shrink. This is important in establishing weights at time of purchase or sale. Dairy-type steers show at least 1 per cent greater shipping shrink than beef-type steers.



MARKETING CHANNELS

Cattle and calves may be sold in several different ways, the choice depending to a large extent upon the type of cattle and the experience of the individual stock raiser. He may market his cattle:

- Directly to a slaughtering plant, or to an agent for a slaughterer, who will negotiate a price with the cattle producer, pay him and then forward the cattle to the plant for slaughter.
- Through public stockyards or country auctions, where the producer will pay a small fee for the benefit of having many buyers, large and small, bid competitively against one another to establish a price for the animals.
- To dealers or drovers who buy cattle at the farm for delivery and sale to packing plants through auction markets or public stockyards.
- Through co-operatives or commission agents who will sell the cattle for the highest price they can obtain through any of the above three channels.

Direct to Packing Plants

There has been an increasing trend to direct sales of fed cattle to packing plants, particularly among large feedlot operators who are able to supply a large and/or continuous quantity of uniform cattle. If a producer sells at the farm, he knows exactly the price he will be paid. He is under less pressure to sell as he has not incurred any marketing expenses and he has full control of the transaction, frequently being able to get the packer to pay shipping charges and other selling expenses. Sales may be made also on a "dressed" basis, which removes some of the risk of having cattle undergraded by buyers when alive. Selling on a dressed basis is helpful in determining the effects of various feeding

practices. The disadvantages are that the stockyard, which functions as the price-setting mechanism, is bypassed with possible detrimental effects on future prices. Then, too, a producer must depend upon packers to report correct weight and grade. Producers are usually not well informed on prices for dressed beef, and they have to bargain on the basis of prices supplied by the buyer. About 55 per cent of fed cattle and 40 per cent of all cattle for slaughter are sold in this manner.

Cattle are also marketed direct to packing plants through a trucker who may act just as a shipper, or who may purchase the cattle from the producer. Deliveries usually are made to a plant that is relatively close, and usually to a plant of the trucker's choice, as the cattle owners rarely specify any conditions other than that they must obtain the best price possible. Approximately 10 per cent of all cattle sold for slaughter are handled by truckers.

Public Stockyards

Shipments to public stockyards are usually made through hired truckers, in a producer's own truck, or occasionally by rail. The producer, when delivering to a stockyard, may consign his animals to a commission firm, a co-operative that acts as a commission agency, or sell them himself. Selling is done either by auction or private treaty.

Public stockyards have several features that give them a definite advantage over other outlets. The stockyard is a competitive market which establishes prices for the cattle market as a whole. A large number of buyers are usually present, offering competitive bids, and thus giving the producer a good chance of getting top prices. Unbiased weighing and expert selling through commission firms or co-operatives is assured. The disadvantages are the longer periods required for hauling and holding, which result in greater shrinkage and higher selling expenses when compared with direct selling to packing plants or locally. Producers in general feel that it is often uneconomical to bring cattle back to the farm once they are shipped, and thus they are at the mercy of an unfavorable market should it occur after shipment. Producers, particularly smaller ones, may have a tendency to overrate their cattle, and then find that prices obtained are not up to expectations.

About 40 percent of all cattle for slaughter are sold through public stockyards, as are about 30 per cent of feeding and replacement cattle.

Auction Markets

Producers of cattle use auction markets as a major marketing channel for cattle, particularly stockers and feeders. Auction markets also are considered to be a good means of selling commercial slaughter cattle, heavy feeder cattle, which could be slaughtered or returned to the farm for further finishing, and replacement cattle. At large auctions, packers, butchers, cattle dealers and feedlot operators bid against one another for most types of cattle. Highly finished cattle, however, are not sold in this manner to any extent.

The advantages of local auction markets are several. They are convenient, weighing is unbiased, shrink is small, payment is immediate, and a producer can protect his interests by bidding on his own cattle. There are also some disadvantages, such as lack of competition among buyers at small sales, instability of prices and speculative action on the part of buyers, and the possibility of spreading disease. About 10 per cent of all cattle for slaughter are sold through local auction markets, and about 50 per cent of replacement and feeding cattle.

At the Farm

A considerable number of cattle are sold at the farm to dealers, drovers and other farmers. A very small number of slaughter cattle may be sold to butchers or dressed and sold as meat. Most breeding stock is sold in this manner, as is a relatively large proportion (20 per cent) of feeding and replacement cattle. Advantages of this type of selling are savings in marketing and transportation costs, limited shrink, and unbiased weights at a local, usually independent, scale. Disadvantages are that buyers usually have a much better idea of grades and prices than the producers and are thus in a stronger bargaining position.

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